

Notice of Allowability**Application No.**

10/779,355

Examiner

KIMBERLY LOVEL

Applicant(s)

PATTERSON ET AL.

Art Unit

2167

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 19 March 2009.
2. ☒ The allowed claim(s) is/are 1,4-7,10-12,14,15 and 17-20.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
(a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
(b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☒ Interview Summary (PTO-413),
Paper No./Mail Date 20090604.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

/Kuen S Lu/
Primary Examiner, Art Unit 2156

DETAILED ACTION

Response to Amendment

1. This communication is in response to the Amendment filed 19 March 2009.
2. Claims 1, 4-7, 10-12, 14, 15 and 17-20 are currently pending. In the Amendment filed 19 March 2009, claims 1, 4-7, 11, 12, 15, 17, 19 and 20 are amended and claims 2, 3, 8, 9, 13 and 16 are canceled. As a result of the Amendment filed 19 March 2009 and the Examiner's Amendment stated below, claims 1, 4-7, 10-12, 14, 15 and 17-20 (renumbered as 1-14) are allowed.

Examiner Amendment

3. Authorization for this examiner's amendment, listed below, was given in a telephone interview with Kevin Shao (Reg. No. 45,095) on 4 June 2009.

In the Claims:

Please amend claims 1, 4, 6, 7, 10, 12, 14, 15, 17 and 19 as follows:

1. (Currently Amended) A computer implemented method for storing data comprising:

receiving a composite data stream from a server;

storing the received composite data stream ~~so that it may~~ that is to be

restored to the server subsequently, said storing including,

decomposing the composite data stream into a plurality

of constituent data streams, the plurality of

constituent data streams including at least a first

constituent data stream of user data and a

second constituent data stream of administrative

data, wherein the composite data stream is

further sectioned into one or more sections, each

section including data from both the first and

second constituent data streams, and wherein

said decomposing includes,

storing a composite data stream map that

indicates how to recompose the plurality

of constituent data streams into the

composite data stream,

wherein the composite data stream map includes

a map header and one or more map

blocks, each map block corresponding to

a section, wherein the map header

includes a composite data stream identifier for identifying the associated composite data stream, a total number of constituent data streams associated with the composite data stream, and a constituent data stream identifier for identifying each of the constituent data streams, and wherein each map block includes information identifying a location of each of the identified constituent data streams;

segmenting at least one of the plurality of constituent data streams decomposed from the composite data stream;

determining which segments resulting from the segmenting match segments already stored;

in lieu of storing those of the segments resulting from the segmenting which are determined to match already stored segments, storing pointers to those already stored segments; and

storing those of the segments resulting from the segmenting determined not to match already stored segments.

4. (Currently Amended) The computer implemented method of claim 1, wherein said storing the received composite data stream further comprises:

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determining the second constituent data stream is ~~of~~ administrative data that ~~may be~~ is to be restored by regeneration rather than being stored; and
discarding said second constituent data stream.

6. (Currently Amended) The computer implemented method of claim 5, wherein the map block of the composite data stream map further comprises a list of one or more composite data stream descriptors, each corresponding to a data stream block to be recomposed for the composite data stream, wherein each composite data stream descriptor includes an identifier identifying a constituent data stream corresponding to a next data stream block and a length specifying a length of the next data stream block in an order, and wherein each composite data stream descriptor indicates, in order, how much of which constituent data stream to take next to recompose the composite data stream.

7. (Currently Amended) A computer implemented method for efficiently storing data comprising:

receiving over time, at a storage server having a composite data stream decomposer/ and recomposer and a segment reuse storage system, a plurality of composite data streams from a server, each of said plurality of composite data streams representing snapshots of data residing at a set of one or more sources taken over said time, wherein the server receives data streams from the client

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applications, wherein the client applications ~~and/or~~ and server insert into the data streams administrative data that is expected upon restore and that if kept in the data streams would result in a relatively low compression efficiency of the segment reuse storage system; and

storing each of said plurality of composite data streams ~~so that it may that~~ is to be restored to the server subsequently, said storing including, decomposing the composite data stream into a plurality of constituent data streams, the plurality of constituent data streams including at least a first constituent data stream of user data and a second constituent data stream of administrative data, wherein the composite data stream is further sectioned into one or more sections, each section including data from both the first and second constituent data streams, and wherein said decomposing includes, storing a composite data stream map that

indicates how to recompose the plurality of constituent data streams into the composite data stream,

wherein the composite data stream map includes a map header and one or more map blocks, each map block corresponding to a section, wherein the map header includes a composite data stream identifier for

identifying the associated composite data stream, a total number of constituent data streams associated with the composite data stream, and a constituent data stream identifier for identifying each of the constituent data streams, and wherein each map block includes information identifying a location of each of the identified constituent data streams; and storing using segment reuse a set of one or more of said plurality of constituent data streams, said storing using segment reuse including performing the following for each of said set of constituent data streams, segmenting the constituent data stream, determining which segments resulting from the segmenting match segments already stored, and storing only those segments of the constituent data stream that cannot be restored using segments already stored.

10. (Currently Amended) The computer implemented method of claim ~~4~~claim 7, wherein said storing each of said plurality of composite data streams further comprises:

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determining the second constituent data stream is ~~of~~ administrative data that ~~may~~ is to be restored by regeneration rather than being stored; and discarding said second constituent data stream.

12. (Currently Amended) A computer implemented method for storing data comprising:

receiving, at a storage server having a composite data stream decomposer/ and recomposer and a segment reuse storage system, a composite data stream from a backup server, wherein the backup server is part of a backup system that includes a client application on a computer coupled to the backup server, said composite data stream representing at least a snapshot of data residing at the computer coupled to said backup server, wherein the client application ~~and/or~~ and backup server insert into the composite data stream administrative data that is expected upon restore and that if kept in the composite data stream would result in a relatively low compression efficiency of the segment reuse storage system;

storing the received composite data stream ~~so that it may~~ that is to be restored to the backup_server subsequently, said storing including decomposing the composite data stream into a plurality of constituent data streams, the plurality of constituent data

streams including at least a first constituent data stream of user data and a second constituent data stream of administrative data, wherein the composite data stream is further sectioned into one or more sections, each section including data from both the first and second constituent data streams, and wherein said decomposing includes, storing a composite data stream map that

indicates how to recompose the plurality
of constituent data streams into the
composite data stream,

wherein the composite data stream map includes a map header and one or more map blocks, each map block corresponding to a section, wherein the map header includes a composite data stream identifier ~~for~~ identifying the associated composite data stream, a total number of constituent data streams associated with the composite data stream, and a constituent data stream identifier ~~for~~-identifying each of the constituent data streams, and wherein each map block includes information identifying a location of each of the identified constituent data streams; and

backing up each of said plurality of constituent data streams
separately, said backing up including, applying segment

reuse to back up a set of one or more of said plurality of constituent data streams including, segmenting at least the first constituent data stream in to current segments; determining which of the current segments match already stored segments; and storing only those of the current segments that do not match already stored segments.

14. (Currently Amended) The computer implemented method of ~~claim~~
~~43~~claim 12, wherein said backing up includes:

discarding the second constituent data stream because it is of administrative data that ~~may~~ is to be restored using regeneration as opposed to storage.

15. (Currently Amended) An apparatus to back up data comprising:
a storage server including,

an interface agent to receive over time composite data streams from a server representing snapshots of data residing at a set of one or more sources;
a composite data stream decomposer and recomposer, coupled to said interface agent, to decompose composite data streams into their constituent data streams and composite data

stream maps, the composite data stream maps indicate how to recompose their corresponding composite data streams from their constituent data streams, the constituent data streams include at least a first constituent data stream of user data and a second constituent data stream of administrative data, and to recompose composite data streams from their constituent data streams and their composite data stream maps, wherein the composite data stream is further sectioned into one or more sections, each section including data from both the first and second constituent data streams, wherein a composite data stream map includes a map header and one or more map blocks, each map block corresponding to a section, wherein the map header includes a composite data stream identifier for identifying the associated composite data stream, a total number of constituent data streams associated with the composite data stream, and a constituent data stream identifier for identifying each of the constituent data streams, and wherein each map block includes information identifying a location of each of the identified constituent data streams; a map file storage, coupled to said composite data stream decomposer and recomposer, to store the composite data stream maps; and

a segment reuse storage system, coupled to said composite data stream decomposer and recomposer, to perform segment reuse to store and restore constituent data streams.

17. (Currently Amended) The apparatus of claim 15 further comprising: an administrative data regenerator, coupled to said composite data stream decomposer and recomposer, to regenerate data from constituent data streams that was not stored because that data ~~could~~ is to be restored by regeneration.

19. (Currently Amended) The apparatus of claim 15 wherein the composite data stream decomposer and recomposer ~~includes~~ is stored in a machine-readable storage medium having stored thereon a set of instructions, which when executed by a set of one or more processors, cause the operations of the composite data stream decomposer/ and recomposer to be performed.

Reasons for Allowance

4. The following is an examiner's statement of reasons for allowance:

In the Examiner's Non-Final Office Action dated 23 December 2008, claims 1, 4-7, 10-12, 14, 15 and 17-20 were rejected under 35 USC 103 based primarily on US PGPub 20020194209 to Bolosky et al and US PGPub 2004/0243643 to Hattrup et al.

The claimed invention is directed towards methods and an apparatus for decomposing a received data stream into a plurality of constituent data stream,

including a first stream of user data and a second stream of administrative data and then using a stored composite data stream map to recompose the data stream. The decomposing of the data stream further includes storing only segments of the stream that have not previously been stored.

The prior art of record, US PGPub 20020194209 to Bolosky et al and US PGPub 2004/0243643 to Hatstrup et al, do not show, teach or suggest the combined limitations of decomposing the composite data stream into a plurality of constituent data streams, the plurality of constituent data streams including at least a first constituent data stream of user data and a second constituent data stream of administrative data; the composite data stream is sectioned into one or more sections, each section including data from both the first and second constituent data stream; storing a composite data stream map that indicates how to recompose the composite data stream; and the further limitations of the data stream map, in combination with the other claimed features. Bolosky discloses the concepts of decomposing a data stream into two data streams, at least one of which includes metadata; segmenting a data stream into smaller blocks; and single instance storage. However, Bolosky fails to disclose the concept of storing and utilizing a map to recompose the data stream. Hatstrup discloses an assembler which assembles a data stream utilizing a formatting map. The Applicant argues on page 15 of the Remarks filed 19 March 2009, the following, "Specifically, Hatstrup fails to disclose that a composite data stream map includes a map header and one or more map blocks, where each map block corresponds to a specific section. Hatstrup further fails to disclose that the map header includes

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a composite data stream identifier for identifying the associated composite data stream, a total number of constituent data streams associated with the composite data stream, and a constituent data stream identifier for identifying each of the constituent data streams. Each map block includes information identifying a location of each of the identified constituent data streams.” The argument is considered to be persuasive.

An updated search for prior art on the EAST database and on domains (NPL- Google, IEEE, ACM) has been conducted. The prior art searched and investigated in the database and domains does not fairly teach or suggest the teaching of the claimed subject matter as described above and reflected by the combined elements in independent claims 1, 7, 12 and 15. Dependent claims 4-6, 10, 11, 14 and 17-20 are indicated as being allowable for the same reasons stated above in regards to the independent claims.

5. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

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Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KIMBERLY LOVEL whose telephone number is (571)272-2750. The examiner can normally be reached on 8:00 - 4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Cottingham can be reached on (571) 272-7079. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/John R. Cottingham/
Supervisory Patent Examiner, Art Unit 2167

/Kimberly Lovel/
Examiner
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4 June 2009
/KL/